

## SPECIFICATION

[Title of the Invention]

5           SET TOP BOX CAPABLE OF PERFORMING WIRELESS TRANSMISSION

[Brief Description of the Drawings]

FIG. 1 is a block diagram of a conventional set top box;

FIG. 2 is a conceptual view of a set top box capable of performing wireless transmission;

and

10           FIG. 3 is a block diagram of a set top box capable of performing wireless transmission according to the present invention.

[Detailed Description of the Invention]

[Object of the Invention]

15           [Technical Field of the Invention and Related Art prior to the Invention]

The present invention relates to an image signal processor, and more particularly, to a set top box capable of performing wireless transmission.

General televisions are standardized to process analog broadcasting signals.

20           As satellite broadcasting and other digital broadcasting are becoming prevalent, a separate converting device called a set top box is provided to process digital broadcasting signals compressed/transmitted in accordance with moving picture experts group (MPEG) and to convert the digital broadcasting signals into analog broadcasting signals, so that users can watch digital broadcasting presented by an analog television.

25           The set top box converts digital-format image signals, such as cable television broadcasting signals and satellite broadcasting signals, into analog-format image signals, thus allowing the analog television to process the digital-format image signals. With the recent demand for digital broadcasting among consumers, the set top box is becoming increasingly widespread.

30           FIG. 1 is a block diagram of a conventional set top box. The conventional set top box includes a tuner 100, a signal separating unit 101, an audio signal processing unit 102, a video signal processing unit 103, a display quality correcting unit 104, a digital-to-analog converter (DAC) 105, a control unit 106, and a memory 107.

The tuner 100 is a vestigial side band (VSB) tuner. The tuner 100 receives a radio

frequency (RF) signal transmitted as a ground wave signal, performs error correction and decoding, and outputs a pure MPEG-2 signal to the signal separating unit 101.

The signal separating unit 101 separates an MPEG-2 video signal and an MPEG-2 audio signal from the MPEG-2 signal output from the tuner 100 and outputs the MPEG-2 audio signal to the audio signal processing unit 102 and outputs the MPEG-2 video signal to the video signal processing unit 103.

The audio signal processing unit 102 processes the MPEG-2 audio signal such that the MPEG-2 audio signal can be audible. The video signal processing unit 103 decodes the MPEG-2 video signal and outputs the resulting signal to the display quality correcting unit 104.

The display quality correcting unit 104 corrects display error during MPEG-2 compression or transmission, thus preventing degradation of display. The DAC 105 converts a signal output from the display quality correcting unit 104 into an analog signal and outputs the analog signal to a monitor (not shown).

The control unit 106 controls the overall operation of the set top box. The memory 107 stores operating programs required for the operation of the set top box and other various data.

U.S. Patent No. 6,233,695 discloses the conventional set top box.

As such, up to date, in order to receive digital broadcasting, a dedicated digital broadcasting receiver must be used or a set top box for receiving digital broadcasting must be mounted. A digital set top box is connected to a television by a wire, and an external device such as a digital video disk (DVD) player is also connected to the set top box or television by a wire, which results in the complexity of wiring. As wall-mount type televisions have come into wide use, it is necessary to consider a counterplan in terms of simplicity of wiring of the set top box and wall-mount type televisions.

Also, since a high definition (HD) image signal input to the set top box from outside cannot be converted into a standard definition (SD) transport (TS) stream image signal, a range of input image sources is inevitably limited.

#### [Technical Goal of the Invention]

The present invention provides a set top box capable of performing wireless transmission by wirelessly transmitting a digital broadcasting signal and converting a high definition (HD) image signal input from outside into a standard definition (SD) transport (TS) stream image signal.

[Structure and Operation of the Invention]

According to one aspect of the present invention, there is provided a set top box capable of performing wireless transmission. The set top box comprises an advanced television system committee (ATSC) receiver, a transport (TS) stream converting unit, and a wireless processing module. The ATSC receiver converts a tuned digital broadcasting signal into a TS stream. The TS stream converting unit converts a high definition (HD) image signal input from outside into a standard definition (SD) image signal and then converts the SD image signal into the TS stream. The wireless processing module wirelessly processes an output of the ATSC receiver or an output of the TS stream converting unit and transmits the processed output.

The set top box further comprises a switching unit which switches the output of the ATSC receiver or the output of the TS stream converting unit.

The set top box further comprises a decoding unit which decodes the TS stream switched by the switching unit and outputs the decoded TS stream to an image device connected to the set top box by a wire.

The TS stream converting unit comprises a converter and an encoding unit. The converter converts the HD image signal input from outside into the SD image signal. The encoding unit converts the SD image signal input from outside or the output of the converter into the TS stream.

The converter comprises an analog-to-digital converter (ADC) and a down converter. The ADC converts the HD image signal input from outside into a digital signal. The down converter converts the HD image signal converted into the digital signal into the SD image signal.

Preferred embodiments of the present invention will now be described with reference to the attached drawings.

FIG. 2 is a conceptual view of a set top box capable of performing wireless transmission. In FIG. 2, an image device 200, a set top box (STB) 201, and an external device (DVD) 202 are illustrated.

FIG. 3 is a block diagram of a set top box capable of performing wireless transmission according to the present invention. The set top box of FIG. 3 includes a tuner 201-1, an advanced television system committee (ATSC) receiver 201-2, a transport (TS) stream converting unit 201-3, a third switching unit 201-4, a wireless processing module 201-5, an MPEG decoding unit 201-6, and a control unit 201-7.

In the present invention, the TS stream converting unit 201-3 includes a first switching unit 201-31, an analog-to-digital converter (ADC) 201-32, a down converter 201-33, a second

switching unit 201-34, and an MPEG encoding unit 201-35.

In the present invention, the ADC 201-32 and the down converter 201-33 are claimed as a converter in claims following later.

Hereinafter, the present invention will be described in detail with reference to FIGS. 2  
5 and 3.

As shown in FIG. 2, the STB 201 of the present invention is connected to the external device (DVD) 202, which reproduces an HD (480p) or SD (480i) image signal, by a wire, but is wirelessly connected to the image device 200.

Although not shown in figures, the image device 200 of the present invention performs a series of processes for receiving a wireless signal transmitted from the STB 201 and displaying the received wireless signal. Also, the STB 201 may be connected to the image device 200 by a wire, and the image device 200 may be connected to the external device (DVD) 202 by a wire.  
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The STB 201 converts a received digital broadcasting signal into a TS stream, wirelessly processes the TS stream, and transmits the TS stream to the image device 200 or decodes the TS stream and then transmits the decoded TS stream to the image device 200 over the wire. Also, the STB 201 converts the HD (480p) or SD (480i) image signal received from the external device (DVD) 202 into a SD (480i) TS stream, wirelessly processes the SD (480i) TS stream, and transmits the SD (480i) TS stream to the image device 200 or decodes the SD (480i) TS stream and then transmits the decoded SD (480i) TS stream to the image device 200 over the wire.  
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The control unit 201-7 controls the overall operation of the set top box 201 and outputs a switching control signal that controls switching operations of the first switching unit 201-31, the second switching unit 201-34, and the third switching unit 201-4.

The tuner 201-1 is a vestigial side band (VSB) tuner. The tuner 201-1 receives a digital broadcasting signal transmitted as a ground wave signal, and the ATSC receiver 201-2 converts the tuned digital broadcasting signal into a TS stream and outputs the TS stream.  
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The ATSC (Advanced Television System Committee) is an international organization founded to establish technical standards of advanced TV systems and also represents established technical standards. The core parts of these standards concern video and audio compression and transmission, in which an image signal is compressed to an MPEG-2 format signal, audio and voice signals are compressed to AC-3 format signals, and transmission thereof is performed using a vestigial side band (VSB) technique.  
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The TS stream converting unit 201-3 converts the HD (480p) or SD (480i) image signal,

input from the external device (DVD) 202, into the SD (480i) TS stream.

The first switching unit 201-31 switches the HD (480p) or SD (480i) image signal, input from outside in response to the switching control signal of the control unit 201-7. The first switching unit 201-31 outputs the HD (480p) image signal, input from outside, to a converter (not shown) including the ADC 201-32 and the down converter 201-33. The first switching unit 201-31 outputs the SD (480i) image signal, input from outside, to the second switching unit 201-34. Although a digital-to-analog converter (DAC) is not shown in figures, the SD (480i) image signal input from outside is converted into the SD (480i) image signal in digital format, and the SD (480i) image signal is output to the second switching unit 201-34.

The converter (not shown) including the ADC 201-32 and the down converter 201-33 converts the HD (480p) image signal, switched by the first switching unit 201-31, into the SD (480i) image signal.

The ADC 201-32 converts the HD (480p) image signal into a three-channel 8-bit HD (480p) image signal in digital format.

The down converter 201-33 converts the three-channel 8-bit HD (480p) image signal into the SD (480i) image signal. In general, a progressive scanning technique involves progressively transmitting information of images rather than transmitting information of images at a time. On the other hands, an interlaced scanning technique involves forming a frame by scanning information of images twice – by scanning the odd numbered lines in the first field, and then scanning the even numbered lines in the second field, thereby filling in gaps between the odd numbered lines. The down converter 201-33 converts the HD (480p) image signal into the SD (480i) image signal by separating fields from the HD (480p) image signal, and then transmitting the separated fields.

The second switching unit 201-34 switches the SD (480i) image signal in digital format, output from the first switching unit 201-31 in response to the switching control signal of the control unit 201-7, or switches an output signal of the down converter 201-33 and outputs the SD (480i) image signal or the output signal of the down converter 201-33 to the MPEG encoding unit 201-35.

The MPEG encoding unit 201-35 encodes the SD (480i) image signal in digital format, switched and output by the first switching unit 201-31, into the TS stream and encodes the HD (480p) image signal, converted into the SD (480i) image signal, into the TS stream.

The third switching unit 201-4 switches the TS stream of a digital broadcasting signal, output from the ATSC 201-2 in response to the switching control signal of the control unit 201-7,

or switches the TS stream output from the MPEG encoding unit 201-35 and outputs the TS stream to the wireless processing module 201-5 or the MPEG decoding unit 201-6.

When the TS stream is transmitted wirelessly, the third switching unit 201-4 switches the TS stream of the digital broadcasting signal output from the ATSC 201-2 or switches the TS stream output from the MPEG encoding unit 201-35 and outputs the TS stream to the wireless processing module 201-5.

When the TS stream is transmitted over the wire, the third switching unit 201-4 switches the TS stream of the digital broadcasting signal output from the ATSC 201-2 or switches the TS stream output from the MPEG encoding unit 201-35 and outputs the TS stream to the MPEG decoding unit 201-6.

The wireless processing module 201-5 wirelessly processes the TS stream of the digital broadcasting signal, a TS stream of an analog broadcasting signal, and a TS stream of an external input image signal and transmits them to the image device 200.

The MPEG decoding unit 201-6 decodes the TS stream of the digital broadcasting signal, the TS stream of the analog broadcasting signal, and the TS stream of the external input image signal and transmits them to the image device 200 over the wire.

While the present invention has been particularly shown and described with reference to an exemplary embodiment thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims and their equivalents.

#### [Effect of the Invention]

As described above, according to the present invention, the set top box is wirelessly connected to the external device and the television, thus simplifying wiring.

Also, a range of input image sources can be enlarged by converting the HD image signal, input to the set top box from outside, into the SD TS stream image signal and transmitting the SD TS stream image signal wirelessly.